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Assistive Technology for Students with Mild Disabilities: Update 2002. ERIC Digest.

Technology has become ubiquitous as a tool for teachers and students. P.L. 100-407, The Technology-Related Assistance for Individuals with Disabilities Act of 1988 (Tech Act) was designed to enhance the availability and quality of assistive technology (AT) devices and services to all individuals and their families throughout the United States. Public Law 105-17, the Individuals with Disabilities Education Act (IDEA), uses the same definitions for assistive technology as the Tech Act and mandates that assistive technology be considered in developing Individualized Education Programs (IEPs) for students with disabilities. IDEA also emphasizes access to the general education curriculum for all students with disabilities.

The Tech Act and the IDEA define an AT device as any item, piece of equipment, or product system (whether acquired off the shelf, modified, or customized) that is used to increase, maintain, or improve the functional capabilities of a child with a disability. AT devices may be categorized as no technology, low technology, or high technology (LD Online, 2001).

"No-technology" or "no-tech" refers to any assistive device that is not electronic. No-tech items range from a piece of foam glued onto the corners of book pages to make turning easier to a study carrel to reduce distraction. "Low-technology" or "low-tech" devices are electronic but do not include highly sophisticated computer components, such as an electronic voice-recording device or a "talking watch" (Behrmann & Schaff, 2001). "High-technology" or "high-tech" devices utilize complex, multifunction technology and usually include a computer and associated software.

Lahm and Morissette (1994) identified areas of instruction in which AT can assist students. Six of these are described here: (1) organization, (2) note taking, (3) writing, (4) academic productivity, (5) access to reference and general educational materials, and (6) cognitive assistance.

ORGANIZATION

Low-tech solutions include teaching students to organize their thoughts or work using flow-charting, task analysis, webbing, and outlining. These strategies can also be accomplished using high-tech, graphic, software-based organizers to assist students in developing and structuring ideas. Such graphic organizers allow students to manipulate and reconfigure brainstormed ideas and color code and group those ideas in ways that visually represent their thoughts. Another high-tech solution might be the outline function of word processing software, which lets students set out major ideas or topics and then add subcategories of information. Using the Internet, local area networks, or LCD projection systems enables students and their teachers to collaborate, give feedback, and modify these applications either as a group or individually at different

times.

NOTE TAKING

A simple, no-tech approach to note taking is for the teacher to provide copies of structured outlines in which students fill in information. Low- and high-tech methods include

* Videotaping class sessions for visual learners or those who are unable to attend class for extended periods of time.

* Sending web-cam photography across the Internet to allow students to see and hear what is happening in class (for students who are unable to attend class).

* Sending class notes or presentations to students via e-mail.

* Translating print-based notes to voice by using optical character recognition (OCR) software with a voice synthesizer.

* Using notebook computers, personal digital assistants (PDAs), or portable word processing keyboards to help students with the mechanics of note taking.

WRITING

Word processing may be the most important application of assistive technology for students with mild disabilities. Writing barriers for students with mild disabilities include

* Mechanics: spelling, grammar, and punctuation errors.

* Process: generating ideas, organizing, drafting, editing, revising, and producing a neat, clear final copy.

* Motivation: interest in writing.

Grammar and spell-checkers, dictionaries, and thesaurus programs assist in the mechanics of writing. Macros are available that will insert an entire phrase with the touch of a single key. Word prediction software helps students recall or spell words.

During the writing process, word processors allow teachers to make suggestions on the student's disk. If computers are networked, students can read each other's work and make recommendations for revision. Computer editing also reduces or eliminates problems such as multiple erasures, torn papers, and poor handwriting. The final copy is neat and legible.

Motivation is often increased through the desktop publishing and multimedia capabilities of computers. A variety of fonts and styles allow students to customize their writing and highlight important features. Graphic images, drawings, video, and audio can provide

interest or highlight ideas. Multimedia gives the student the means and the motivation to generate new and more complex ideas. For early writers, there are programs that allow students to write with pictures or symbols as well as text. In some of these programs, the student selects a series of pictures to represent an idea, then the pictures are transformed to words that can be read by a synthesizer and then edited.

ACADEMIC PRODUCTIVITY

Tools that assist productivity can be hardware-based, software-based, or both. Calculators, for example, can be separate, multifunction devices or part of a computer's software. Spreadsheets, databases, and graphics software enhance productivity in calculating, categorizing, grouping, and predicting events. The Internet, computers, and PDAs can also aid productivity in note taking, obtaining assignments, accessing reference material and help from experts, and communicating with peers. Instead of relying on the telephone, students are increasingly sharing documents, using instant messaging, and transferring documents to each other as e-mail attachments.

ACCESS TO REFERENCE AND GENERAL EDUCATIONAL MATERIALS

Access to the general education curriculum is emphasized by IDEA and includes the ability to obtain materials as well as the ability to understand and use them. Many students with mild disabilities have difficulty gathering and synthesizing information for their academic work. In this arena, Internet communications, multimedia, and universal design are providing new learning tools.

Internet communications can transport students beyond their physical environments, allowing them to interact with people far away and engage in interactive learning experiences. This is particularly appropriate for individuals who are easily distracted when going to new and busy environments such as the library, who are poorly motivated, or who have difficulty with reading or writing. Students can establish "CompuPals" via e-mail or instant messaging with other students, which often motivates them to generate more text and thus gain more experience in writing. Students can also access electronic multimedia encyclopedias, library references, and online publications. However, these experiences should be structured, because it is easy to get distracted or lost as opportunities are explored.

Multimedia tools are another way in which information can be made accessible to students. Multimedia use of text, speech, graphics, pictures, audio, and video in reference- based software is especially effective in meeting the heterogeneous learning needs of students with mild disabilities. While a picture can be worth a thousand words to one student, audio or text-based descriptive video or graphic supports may help another student focus on the most important features of the materials.

Used in conjunction with assistive technology, e-books can use the power of multimedia

to motivate students to read. They include high-interest stories: the computer reads each page of the story aloud, highlighting the words as they are read. Fonts and colors can be changed to reduce distraction. Additional clicks of the mouse result in pronunciation of syllables and a definition of the word. When the student clicks on a picture, a label appears. A verbal pronunciation of the label is offered when the student clicks the mouse again. Word definitions can be added by electronic dictionaries and thesaurus. These books are available in multiple languages, including English and Spanish, so students can read in their native language while being exposed to a second language.

The Center for Applied Special Technology (CAST) promotes the concept of universal design (Rose & Meyer, 2000), which asserts that alternatives integrated in the general curriculum can provide access to all students, including a range of backgrounds, learning styles, or abilities. Providing material in digital form, which can easily be translated, modified, or presented in different ways, can often attain the goal of universal design.

COGNITIVE ASSISTANCE

A vast array of application program software is available for instructing students through tutorials, drill and practice, problem solving, and simulations. Many of the assistive technologies described previously can be combined with instructional programs to develop and improve cognitive, reading, and problem-solving skills. Prompting and scheduling through PDAs, pagers, and Internet software also can assist students in remembering assignments or important tasks. They can help students to follow directions or a sequence of events, establish to-do lists, take and retrieve notes, check spelling or look up words in a dictionary.

CONCLUSION

Special educators are familiar with the need to create or customize instructional materials to meet the varied needs of students with disabilities. Today, assistive technology can be more specifically targeted to address an individual's needs through the emergent power and flexibility of electronic tools and the ways in which they are combined and used. These innovations affect teaching and learning as well as individual capabilities. For students with mild disabilities, assistive technology can help to balance weak areas of learning with strong areas.

RESOURCES

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Center for Applied Special Technology http://www.cast.org

Closing the Gap http://closingthegap.com

Journal of Special Education Technology http://jset.unlv.edu

LD Online www.ldonline.org

Literacy Access Online http://www.literacyaccessonline.org

The National Assistive Technology Research Institute http://natri.uky.edu

Internet resources cited in this document were current at the time of publication. Please note that Web addresses are subject to change.

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